UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/850,040	05/07/2001	George E. Carter	01 P8145 US	9560

7590 02/17/2004	**EXAMINER**
Siemens Corporation	SINGH, RAMNANDAN P
Attn: Elsa Keller, Lega Administrator	

Intellectual Property Department
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ART UNIT	PAPER NUMBER
2644	

DATE MAILED: 02/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>17 November 2003</u>.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-30</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-5,8-18 and 22-30</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☒ Claim(s) <u>6,7 and 19-21</u> are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____ .

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Election/Restrictions

1.   This application contains claims directed to the following patentably distinct species of the claimed invention:

  Species I: Claims 5, 14, 17, 28 are directed to voice frequency bands,

  as shown in Fig. 5; and

  Species II: Claims 6-7, 19-21 are directed to power line frequencies,

  as shown in Fig. 9.

2.   Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, Claim 1 is generic.

3.   Applicant's response filed on 17 November 2003 elected the claims of Species I for further prosecution. As a result, claims 6-7 and 19-21 are withdrawn by the Applicant. Hence, this restriction requirement is made FINAL.

Response to Arguments

4.   With the finding of new art, new ground (s) of rejection are made. In light of this,

Applicant's arguments filed on 07 May 2002 have been considered but are moot in view

of the new ground(s) of rejection.

5.   **Status of Claims**

Claim 27 is <u>amended.</u>

Claims 1-5, 8-18, 22-30 are <u>pending.</u>

Claim Rejections - 35 USC § 112

6.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

7.   Claim 5 recites the limitation "**the first band..., the second band....and the**

third band... " in Claim 1. There is insufficient antecedent basis for this limitation in

the claim.

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9.   Claims 1-2, 9-10, 22-26 are rejected under 35 U.S.C. 102(b) as being

anticipated by Nishiguchi et al [Us 5,664,052] .

Regarding claim 1, Nishiguchi et al teaches a method and device, as shown in

Fig. 6, for making discrimination between the voiced sound and the noise or the

unvoiced sounds in the speech [col. 1, lines 8-33; col. 2, lines 9-28], the method

comprising: receiving digital speech signal at an input terminal 51; performing time-to-

frequency domain conversion on the digital signals using fast Fourier transform (FFT)

(53); detecting whether the input speech signal is voiced or invoiced (i.e. noise) at

discriminating unit 64; and <u>setting to UV (unvoiced) at block 65 to suppress the noise</u>

<u>only</u> if the signal is decided to be noise or unvoiced [col. 1, lines 41-46; Fig. 6; col. 13,

line 52 to col. 14, line 24; col. 12, line 49 to col. 13, line 51; Fig. 4; col. 8, line 38 to col.

9, line 10; col. 9, line 49 to col. 10, line 33; Fig. 5, col. 11, lines 44-48; col. 10, line 34 to

col. 11, line 43; Fig. 8; col. 17, lines 43-67; col. 20, line 61 to col. 21, line 2; Abstract].

Claim 25 is essentially similar to claim 1 except for a first specific time period. Nishiguchi et al further teaches a windowing operation and window analysis using a specific time period [[Figs. 9a, 9b, 10].

Claim 22 is essentially similar to claim 1 except for a first band in the frequency domain. Nishiguchi et al further teaches discriminating a voiced sound from an unvoiced sound or noise in input speech signals **by dividing the input speech signals into <u>blocks</u>** (i.e. bands) and giving a decision for each of these blocks as to whether or not the speech signals are voiced [Figs. 4-6, 8; col. 2, lines 32-67].

Regarding claim 2, Nishiguchi et al further teaches applying a threshold for detecting whether noise is present [Fig. 6; col. 13, lines 52-65].

Regarding claims 9-10, Nishiguchi et al further teaches setting to UV (un-voiced) (i.e. using a filter) or not setting to UV ((i.e. not using a filter) at blocks 64 and 65 [Fig. 6].

. Claim 26 is essentially similar to claim 10 and is rejected for the reasons stated above.

Regarding claim 23, Nishiguchi et al further teaches applying a high pass filter 102 [Fig. 8].

Regarding Claim 24, Nishiguchi et al further teaches applying a mean (i.e. average) value of the input samples for each block [col. 5, line 62 to col. 6, line 30].

10.   Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Seki et al [US 5,677,987].

Regarding claim 1, Seki et al teaches a noise (i.e. non-voice sound) detection and suppression system shown in Figs. 1-2 , comprising:

receiving analog signals from microphone 120 at input terminal 1;

converting the analog signals into digital signal using A/D converter 2;

performing time-to-frequency domain conversion using FFT (7) on the digital signals;

detecting whether noise is present in the frequency domain signals using detector 8 shown in Fig. 5; and

applying the filter (i.e. notch filter) 3 to remove the noise if noise is detected in the frequency domain signals by the detector 8 [col. 4, line 66 to col. 5, line 30; col. 6, lines 28-63]. It may , however, be noted that the notch filter 3 does not kick in unless the detector 8 detects noise, and, subsequently sends its response to coefficient selection means 9.

Regarding claim 2, Seki et al further teaches detector 8 using a threshold for detecting whether noise is present [Fig. 5; col. 5, line 56 to col. 6, line 27].

11.   Claims 1-2, 11 are rejected under 35 U.S.C. 102(e) as being anticipated by

deVries [US 6,289,309 B1].

Regarding Claims 1-2, DeVries teaches a method and spectrum-based speech

enhancement system by tracking the noise spectrum of a mixed speech and noise

signal shown in Fig. 1 [Abstract]; the method comprising:

receiving digital signals after using A/D convert 114 on analog voice signals;

transforming the digital signals into frequency domain signals using DFT 118 [col.

3, lines 4-48];

detecting noise components of the transformed voice and noise signal; and

removing the noise when noise is detected [col. 1, lines 12-15; col. 3, lines 49-58; col. 4,

line 33 to col. 5, line 20].

Regarding Claim 11, the method may be practiced **by programming a general**

purpose computer, wherein the filter is implemented in software [col. 2, line 64 to col.

3, line 3].

Claim Rejections - 35 USC § 103

12.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13.   Claims 16, 18, 27, 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Graupe et al [US 4,185,158] in view of deVries [US 6,289,309 B1].

Regarding Claim 16, Graupe et al teaches a method and a system 100 for enhancing sound quality shown in Fig. 1, the system comprising:

a noise-analysis circuit 102 and a noise-reduction circuit 104 wherein each of the two circuits comprises a plurality of bandpass filters that divide the input signals into a plurality of frequency bands 1, 2, --,N [col. 3, lines 41-56]. The bandpass filters may be digital filters or employ an analog-to-digital converter (ADC) 160 [col. 3, lines 6-10;

col. 4, lines 3-11]. Microprocessor 170 shown in Fig. 1 detects noise, identifies the

parameters of the noise and provides gain adjustment information for the filters of circuit

102. Threshold comparison is carried out by comparator 107 whose output 110, with

respect each band, is indicative of noise in any band. If desired, the system can be

organized so that noise is assumed only if the threshold is exceeded in each band

[col. 5, line 66 to col. 6, line 27]. Graupe et al further demonstrates an application of the

invention to solving hearing aid problems shown in Fig. 7, wherein noise-analysis circuit

208 is similar to circuit 102 and noise reduction-circuit 210 to circuit 104. In this test, he

applies a criterion **to detect noise in any band, whose output, during the test**

interval, is constantly well above the outputs of any of the other bands by more

than a predefined value. When such a band is identified, the gain of the corresponding

filter in noise-reduction circuit 210 is adjusted. Hence Graupe et al teaches the element,

"if the amplitudes of sounds in a middle band exceed the amplitudes of sounds in low

and high bands by a predetermined amount" as claimed in Claim 16. Thus, Graupe et

al anticipates this element of Claim 16 in a time-domain as shown above.

Graupe et al teaches implementation of his invention in a time domain [Figs. 1-7].

It is , however, well-known to persons of ordinary skill in the art that implementation of

a frequency domain version of this invention can be accomplished through the use of

Fast Fourier transforms (FFTs) or Discrete Fourier transforms (DFTs).

deVries teaches a frequency domain technique for speech enhancement using

DFT 118 with digital signals [Fig. 1; [col. 1, lines 12-15; col. 3, lines 4-58; col. 4, line 33

to col. 5, line 20].

At the time of the invention, it would have been obvious to a person of ordinary

skill in the art to apply the frequency domain technique of deVries to the Graupe et al

system as an alternative to the implementation of the time domain.

Claim 27 is essentially similar to Claim 16, except a computer readable medium

that stores the computer codes. Graupe et al teaches . detecting noise, identifying the

parameters of the noise, and providing gain adjustment for the filter of circuit 102

wherein these functions can be carried out by **suitably programming** a general

purpose mricroprocessor [col. 5, line 66 to col. 6, line 4].

Regarding Claim 18, Graupe et al teaches smoothing a variable by using an

average value of a variable by computing a running average over a short interval of time

[col. 1, line 64 to col. 2, line 16].

Claim 29 is essentially similar to Claim 18 except the computer program product

as Graupe et al has shown above.

Regarding Claim 30, the combination of Graupe et al and deVries teaches the method of the invention that can be practiced by programming a general purpose computer wherein the codes reside in a computer program on a computer-readable medium such as a diskette, CDROM, tape or memory or radio frequency carrier signal [deVries; col. 2, line 64 to col. 3, line 3].

14.   Claims 12, 13, 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi et al [Us 5,664,052].

Regarding Claim 12, Nishiguchi et al teaches a method and device, as shown in Fig. 6, for making discrimination between the voiced sound and the noise or the unvoiced sounds in the speech [col. 1, lines 8-33; col. 2, lines 9-28], the method comprising: receiving digital speech signal at an input terminal 51; performing time-to-frequency domain conversion on the digital signals using fast Fourier transform (FFT) (53); detecting whether the input speech signal is voiced or invoiced (i.e. noise) at discriminating unit 64; and setting to UV (unvoiced) at block 65 to suppress the noise if the signal is decided to be noise or unvoiced [col. 1, lines 41-46; Fig. 6; col. 13, line 52 to col. 14, line 24; col. 12, line 49 to col. 13, line 51; Fig. 4; col. 8, line 38 to col. 9, line 10; col. 9, line 49 to col. 10, line 33; Fig. 5, col. 11, lines 44-48; col. 10, line 34 to col. 11, line 43; Fig. 8; col. 17, lines 43-67; col. 20, line 61 to col. 21, line 2; Abstract]. Nishiguchi et al further teaches discriminating a voiced sound from an unvoiced sound or noise in input speech signals by dividing the input speech signals into **blocks** (i.e.

bands) and giving a decision for each of these blocks as to whether or not the speech

signals are voiced [Figs. 4-6, 8; col. 2, lines 32-67].

Nishiguchi et al does not teach expressly making an inter-band comparison

using two or more bands for detecting noise and deciding such as "**substantially the**

same" as claimed in Claim 12. It is, however, well-known in the art that the amplitude

of the spectrum of a white noise is **flat (i.e. uniform) over all frequencies**. It is,

therefore, obvious that, in absence of speech signals, the amplitudes of the spectra of

sounds in two or more frequency bands are substantially same, when the white noise is

present.

Regarding claim 13, the limitations are shown above.

Regarding Claim 15, Nishiguchi et al further teaches applying a mean (i.e.

average) value of the input samples for each block [col. 5, line 62 to col. 6, line 30].

15.   Claims 3-4, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Nishiguchi et al as applied to Claim 1 above.

Regarding Claims 3 and 8, Nishiguchi et al further teaches a method for

discriminating a voiced sound from an unvoiced sound or noise in input speech signals

by dividing the input speech signals into **blocks** (i.e. bands) and giving a decision for

each of these blocks as to whether or not the speech signals are voiced [Figs. 4-6; col.

2, lines 32-67].

Nishiguchi et al does not teach expressly making an inter-band comparison

using two or more bands for detecting noise and deciding such as "**substantially the**

same" as claimed in Claim 3. It is, however, well-known in the art that the amplitude of

the spectrum of a white noise is **flat (i.e. uniform) over all frequencies**. It is,

therefore, obvious that, in absence of speech signals, the amplitudes of the spectra of

sounds in two or more frequency bands are substantially same, when the white noise is

present.

Claim 4 is essentially similar to Claim 3, and is rejected for the reasons stated

above.

16.   Claim 5 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Nishiguchi et al as applied to claims 1 and 12 above, and further in view of either

Harris et al [US 4,255,620] or Fielder [5,752,225].

Regarding claims 1, Nishiguchi et al does not teach expressly three specific

subbands as claimed in Claim 5.

Harris et al teaches a basis for selecting these three sub-bands for detecting

speech sounds. It has long been known that the prime intelligibility of human speech

lies in the band from about 1000 to about 3000 Hz, and that human speech is naturally

temporally divided   into higher frequency components (the consonants) occurring in the

range from about 1500 to about 3000 Hz and lower frequency components (vowels)

occurring in the rang from about o to about 1500 Hz [col. 25-52]. The cross-over region

at approximately 500 Hz is a potential distortion region [col. 10, lines 15-47]. Fig. 4F

illustrates the time averaged spectrum of signals [Figs. 4E, 4F; col. 10, line 60 to col. 11,

line 35].

Fielder teaches an empirical technique for allocating a whole band into sub-

bands. Fig. 7 illustrates critical band spectra of the output noise and distortion.

Allocation C is then the same as allocation B for frequencies in the upper part of the

audio band above 1500 Hz. The dotted line shows the auditory masking curve for a 500

Hz tone [col. 3, line 50 to col. 4, line 43].

At the time of the invention, it would have been obvious to a person of ordinary

skill in the art at the time the invention was made to select the three sub-bands of Harris

et al and Fielder, wherein the low band includes sounds less than 500 Hz, the middle

band includes sounds from 500 to 1500 Hz, and the high band includes sound greater

than 1500 Hz with the three sub-bands of Nishiguchi et al. The motivation for this

selection of these subbands would have been to use the actual bandwidth occupied by

human speech sound, and speed up detecting audio signals [Harris et al; col. 1, lines 11-16].

Claim 14 is essentially similar to Claim 5, and is rejected for the reasons stated above apropos of claim 5.

17.   Claims 17 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Graupe et al and deVries as applied to claims 16 and 27 above, and further in view of either Harris et al [US 4,255,620] or Fielder [5,752,225].

Regarding claims 17, the combination of Graupe et al and deVries does not teach expressly three specific subbands as claimed in Claim 17.

Harris et al teaches a basis for selecting these three sub-bands for detecting speech sounds. It has long been known that the prime intelligibility of human speech lies in the band from about 1000 to about 3000 Hz, and that human speech is naturally temporally divided into higher frequency components (the consonants) occurring in the range from about 1500 to about 3000 Hz and lower frequency components (vowels) occurring in the rang from about o to about 1500 Hz [col. 25-52]. The cross-over region at approximately 500 Hz is a potential distortion region [col. 10, lines 15-47]. Fig. 4F illustrates the time averaged spectrum of signals [Figs. 4E, 4F; col. 10, line 60 to col. 11, line 35].

Fielder teaches an empirical technique for allocating a whole band into sub-bands. Fig. 7 illustrates critical band spectra of the output noise and distortion. Allocation C is then the same as allocation B for frequencies in the upper part of the audio band above 1500 Hz. The dotted line shows the auditory masking curve for a 500 Hz tone [col. 3, line 50 to col. 4, line 43].

At the time of the invention, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to select the three sub-bands of either Harris et al or Fielder, wherein the low band includes sounds less than 500 Hz, the middle band includes sounds from 500 to 1500 Hz, and the high band includes sound greater than 1500 Hz with the three sub-bands of Graupe et al. The motivation for this selection of these subbands would have been to use the actual bandwidth occupied by human speech sound, and speed up detecting audio signals [Harris et al; col. 1, lines 11-16].

Claim 28 is essentially similar to Claim 17, and is rejected for the reasons stated above apropos of claim 17.

Conclusion

18.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Ramnandan Singh whose telephone number is (703)308-6270. The examiner can normally be reached on M-F(8:00-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Forester Isen can be reached on (703)-305-4386. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9314 for regular communications and (703)872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)306-0377.

Dr. Ramnandan Singh
Examiner
Art Unit 2644

January 29, 2004

SPE, AU 2644